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LITERATURE.

RECENT STUDIES OF NORMAL ILLUSIONS OF MEMORY.

Analysis of the memory consciousness reveals a group of organic sensations and affective processes as the characteristic mark of familiarity in certain parts of our experience. These constitute the added symbol that connects them definitely with our own past. How efficient is this symbol, and what are the ways in which it may fail to fulfill its duty, we may ask, for nature has made few things perfect, and our memory is no exception to this rule. False memory, even more than false perception, is no useful function of mind. Yet, like the illusions of perception, the illusions of memory must be regarded as a result of normal functions at work under somewhat unusual conditions.

In the review of the literature given below I shall not follow Titchener's inclusive use of the term 'memory illusion,'¹ but shall limit the consideration to *paramnesia* as a normal process, that is, as it occurs in every day life. Taken in this limited sense, memory illusion is not a topic that has yet received very much attention in the text books, and general treatises on psychology, though special articles on the subject have not been infrequent.² This neglect is the more remarkable in view of the fact that false memory is a matter of relatively frequent occurrence and is certainly of great practical importance. There are also no great difficulties in the way of its investigation. Experiment has not, however, been seriously applied to the study of it until within the last five years. Of the studies that have been made within that time I shall take up first merely the quantitative aspect of normal memory illusion, after that some of the conditions upon which memory illusion depends. Our first question is: To what degree can our memory generally be depended upon? To what extent is our subjective certainty a measure of objective reality? We may consider this question, first, independently of the conditions under which the memory illusions occur. We might suppose on the one hand that the ability to tell whether one really remembers a thing or not could not depend upon anything but upon the degree with which one tries (or on other characteristics of the person remembering) and had nothing to do with the things remembered or other external conditions. And, on the other hand, we might suppose that a real memory illusion, analogous to the illusions of perception, would depend more upon the external condition of the things to be remembered than upon the person trying to remember. These are two things that should be kept in mind in considering the results that are regarded as instances of memory illusion.

Some of the studies on the amount of forgetting under different conditions give incidentally something on the amount of memory illusion. I shall describe, first, very briefly, several studies in which relatively simple material and short time intervals were used, and then gather the results together in one table. The same will then be done for the more complex material and longer time intervals. Whipple in his

¹ Outline of Psychology, 1896, p. 285.

² For one of the earlier ones see Burnham's Study of Memory, this *Journal*, Vol. II, 1889, pp. 431-464.

study on the memory for the pitch of tones gives in one of his tables the right and wrong cases in two groups—the judgments made with certainty and those made with uncertainty as to correctness.¹ Simmons presented to his subjects a series of colors, each color being followed by a numeral. After a certain time interval the series of colors was again shown slowly while the subject was requested to record for each color the first numeral that occurred to him, stating also whether he regarded that numeral as the correct one, the wrong one, or whether he was doubtful.² Finzi presented visually series of numerals, nonsense syllables, and words to his subjects and after time intervals of from two to thirty seconds asked the subject to try to recall the series. He gives the results on the amount of memory error.³ Diehl exposed groups of numerals, lines in different positions, and colors for ten seconds at a time and had the subject recall the groups after 24 hours.⁴ These four studies give the following results on the amount of memory error:

Wrong.	Right.		
26.6 %	73.4 %	Certain	} Whipple
48.9 "	51.0 "	Uncertain	
47.0 "	52.9 "	Simmons	
21.0 "	76.5 "	Finzi	
11.6 "	80.6 "	Diehl	
36.6 "			

This gives a general average of 36.6% wrong. That is to say, in 36% of the instances when one reports a thing from memory and thinks he is correct, he is mistaken. But on account of the great variations this average means comparatively little. Perhaps most significant among these figures is the 26.6% wrong in Whipple's results when the subjects were 'certain' that their judgments had been correct. When they were doubtful but still thought they were correct they were wrong about half the time, 48.9% of the number of instances. Some indication is also given of the effect of the nature of the material upon memory illusion. The simpler material seems to be more conducive to memory illusion.

The conditions in the studies just considered are found only in the laboratory. Most of the recent studies on memory illusion and its related problems have been made with more complex materials than these and with longer time intervals. The aim has been to approach more nearly the usual conditions of every day life. The interest of the investigators has always been the practical one. How far can we depend upon our memory for accuracy under the conditions in which we commonly use it? The studies that come under this topic may be divided into three groups, according to the material used. (1) A complex picture has been shown the subject, and the same described from memory after different time intervals. (2) Subjects have been asked to describe from memory a place they have seen once (or many times), not knowing beforehand that they would be called upon to do so. (3) Subjects have been asked to describe an event which they had witnessed, generally without knowing that they would be called upon to do so. Not all of these, however, give a quantitative statement of the degree of memory illusion, being concerned with other related questions.

¹ *Am. Jour. of Psych.*, 1901, p. 421.

² Prevalence of Paramnesia. *Psy. Rev.*, 1894.

³ Zur Untersuchung der Auffassungsfähigkeit und Merkfähigkeit. *Psychol. Arbeiten*, III, 1901.

⁴ Zum Studium der Merkfähigkeit. Experimentelle-psychologische Untersuchung, Berlin, 1902.

Lobsien used a picture of a country scene, with a small boy fishing in a brook in the foreground, and some buildings, trees and a bridge, etc., further back. This was shown for two minutes to school children, aged 9-14 years. Immediately afterwards they were asked to answer twelve questions concerning the picture. On three of these questions he gives the results concerning the matter in which we are now interested.¹ Wreschner used a picture of an old man holding a bowl of food on his lap, from which he is feeding a small boy standing by his side. This was shown to adult subjects for forty-five seconds. After different time intervals, varying from nineteen hours to seventeen days, these subjects answered a list of questions concerning the picture. Some of them without seeing the picture a second time described it in this way more than once.² Stern showed a colored picture to school children, aged 10-12 years, for one minute. The picture was that of a "Bauernstube," and more complex than the others so far mentioned. Immediately after being shown the picture, the children described it from memory in as full detail as they could, first without the aid of questions. When this had been done they answered in addition a list of supplementary questions concerning the picture.³ Borst used five different pictures: 1. Picture of three children playing with a sheep in a meadow. 2. Picture of a rabbit. 3. Picture of three children in a garden. 4. Picture of a woman and two children looking for mushrooms. 5. A shepherd with a child and dog, driving some sheep through the woods. Each of these was shown for one minute to adult subjects. After time intervals of three, and nine days the subjects described them, first, without questions, and then immediately afterwards answered a list of questions concerning them. The quantitative results from these studies may be brought together in general averages, disregarding, for the time being, the differences in the conditions under which these results were obtained. The average percentages of wrong statements made by the subjects when they thought they were right are as follows:

Wrong.		
89.0 %	No. in each class of things in picture,	} Lobsien.
89.5 "	Material in roof of house,	
32.0 "	Material in bridge,	
26.0 "		Wreschner.
22.0 "		Stern.
14.3 "		Borst.

Of these figures the very high percentages from Lobsien's results bring out a matter to be considered with more detail later. They are percentages of the number of wrong statements in answer to particular questions, and the questions refer to things in the picture that the subjects did not particularly attend to.

Two other studies in which the subjects described from memory a place they had seen several times, without knowing that they would be called upon to do so, may also be considered at this point. Lipmann asked his students to describe a lecture room (in which they had met ten times) on the third day after they had ceased to meet there. They described it first spontaneously and then answered a list of questions.⁴ Stern did the same with his class eight days after they had met in the

¹ Aussage und Wirklichkeit bei Schulkindern. Einige experimentelle Beobachtungen. *Beiträge z. Psychol. d. Aussage*, Vol. I, 1903, pp. 158-221.

² Zur Psychologie der Aussage. *Archiv f. Gesamte Psychol.*, I, 1903, pp. 148-183.

³ Die Aussage als geistige Leistung und als Verhörsprodukt. *Beiträge z. Psychol. d. Aussage*, 1904, pp. 269-415.

⁴ Experimentelle Aussagen über einen Vorgang und eine Lokalität. *Beiträge z. Psychol. d. Aussage*, I, 1903, pp. 222-231.

lecture room in question. The description was made this time, only in answer to questions.¹ For these two studies the degree of memory illusion is: Lipmann—27% wrong; Stern—18.9% wrong.

Lipmann and Stern also had their students describe an event, which took place in the lecture room, some time after its occurrence—an event which at the time of its occurrence they had not known they would be called upon to describe. Lipmann's 'event' was as follows: "At about 9.45, during my lecture, there was a knock at the door of the lecture room. I called, 'Come in,' and a girl entered and whispered to me. She is small, has brown hair and eyes, wears a large, black felt hat, black jacket with double row of buttons, black skirt, black shoes and gloves, and carries an umbrella. I answer her: 'I have no time now; you may wait for me, I shall be through soon.' 'Then I may wait here?' 'I don't care. Take a seat there, but keep quiet.' She takes a book from the lecturer's desk, sits down and reads until 9.55, when she exclaims suddenly, 'It is frightfully hot here; may I open the window a little?' and rises and reaches out to open the window. 'Oh no, leave it now. It is not that hot—is it (turning to my class). You may wait outside.' 'It is too warm for me here; I shall wait outside.' She goes out quickly, putting the book into her pocket."² Two days after two subjects described this occurrence from memory, again, first spontaneously, and then in answer to questions. Three subjects did the same three days after. Stern used a similar occurrence in a lecture-room for his experiment. During the lecture a student comes in, asks to speak with Stern, hands him a manuscript, and asks permission to consult some books in a bookcase in the room. He goes to the bookcase, takes out a book and reads for five minutes. Then leaves the room, taking the book with him. On leaving, Stern asks him to wait outside until he is through. A week later the students witnessing this event were asked to describe it, first, without questions, and then with them.³ The results of these studies were: Lipmann—33% wrong; Stern—32% wrong,—all of statements that the subjects thought to be correct.

Let us stop a moment, now, and consider all these results together. They have been obtained under a considerable variety of conditions, as was noted, but, excluding two,—the 48% of wrong judgments obtained by Whipple, when the subjects were *uncertain*, and the 47% wrong of Simmons, in an entirely different kind of experiment—the general averages do not vary very greatly. They agree in fact much more closely than results generally do when the conditions have been so different. Considered as exact quantitative statements of the degree of memory illusion they can have no general significance but they go to show that the average man is likely to be mistaken about one-fourth of the time when he reports a thing from memory, and conscientiously believes that he is speaking the truth. This result is certainly not in harmony with general conceptions of the trustworthiness of memory, and should go far towards shaking pre-conceived notions on the matter. Intelligent and observant men know that there are such things as memory illusions, but I doubt whether many would, from a guess, place the figures nearly so high as those we have cited. The "man on the street," however, does not proceed upon the assumption that there is any such thing as memory illusion. For him, every man knows whether he is speaking the truth or not in matters of memory. He either knows, remembers that a thing is so, which in that case *is* objectively so, or he has forgotten. Stern points out that the naïve

¹ Wirklichkeitsversuche. *Beiträge z. Psychol. d. Aussage*, II, 1904, pp. 1-32.

² *Op. cit.*, p. 91.

³ Wirklichkeitsversuche, p. 15.

mind makes two assumptions. First, that a statement conscientiously made with certainty is objectively correct. And second, that a statement that is not objectively true, is subjectively a lie.¹

In the further consideration of memory illusion we may take up some of the conditions that have been found to influence its degree. From the data on these we may also infer something as to the nature of the causes of it. In the question as to how much one can remember at all, we should rightly expect, without special investigation, that the amount would depend upon the time intervening, the degree of attention paid at the time of the experience, and perhaps, also, upon the nature of the material. The same would, however, hardly be expected to be true of the degree of memory illusions. We may forget more as time goes on, but why should we remember falsely more? And similarly, as regards the original degree of attention and the other conditions. The facts, however, are again not in accord with *a priori* expectations.

Let us consider results that have been reached with regard to the influence of the passage of time upon the extent of memory illusion. In an experiment made by Henderson² short passages were read to the subjects who were then requested, among other things, to write out what they had remembered of this, after two days, and again after four weeks. Each time they were requested to use the same words as in the original, when remembered, and to underscore those which they thought had occurred in the original. In one of Stern's experiments already quoted the subjects described four times, a picture, which they had seen but once, the first time immediately after it had been shown, and then again after intervals of five, fourteen, and twenty-one days. In a similar experiment by Wreschner the picture was described from memory three times after different time intervals, varying with the different subjects. In Borst's study time intervals of three and of nine days were used. Other studies of this question do not give quantitative results on this particular point. Bringing the figures from these several studies together gives the following table for the extent of memory illusion after different time intervals:

1st recall.	2nd recall.	3rd recall.	4th recall.	
	27.6% (2 d.)	28.5% (4 wks.)		Henderson.
10.5% (3 d.)	12.1" (9 d.)			Borst.
11.5"	12.5"	28.1"		Wreschner.
5.8" (Immediate.)	7.3" (5 d.)	10.1" (14 d.)	12.8% (21 d.)	Stern.

These figures demonstrate clearly that memory illusion *increases with time* as well as does the amount that we forget entirely. The studies made, do not, however, permit the plotting of a curve for memory illusion, comparable to the curve for forgetting. The interpretation of the fact of this increase in memory illusion with the passage of time may be left until the results with regard to the other conditions influencing the extent of memory illusion have been considered.

A second condition that has been shown to be influential in this way is that of the degrees of attention given to the different parts of the complex experience, and the difference in the nature or aspects of the material itself. These two factors cannot be separated in such studies as those now before us. When a complex picture is presented there are many things to be observed. Left to itself, attention will seize upon the central things and many details will not be noticed at all. The picture itself is so constructed, indeed, that all normal observers will tend to do just this thing. They will vary from this only

¹ Aussagesstudium. *Beiträge z. Psychol. d. Aussage*, I, 1903, p. 48.

²A Study of Memory for Connected Trains of Thought. *Psy. Rev. Mon. Suppl.*, 1903.

in the degree in which they have special interests. Furthermore the nature of the material itself varies in different cases over a wide range, showing difference in forms, colors, intensities, numerical and spatial relations. Such differences would account at once for differences in the *amount* of these different things remembered. But it is not equally plain at once that there should be different degrees of memory illusions for these things. If one has not observed a thing closely it is easy to understand why he should be more apt to forget it altogether, but this is different from his more readily remembering it falsely. Some of the numerical results in the difference in the extent of memory illusion for the different things or aspects of things in a complex experience are as follows: In Diehl's study numerals, colors, lines in certain positions, and angles were presented in groups. The percentages of memory illusion for these are:

Numerals.	Colors.	Lines.	Angles.
15.3%	10.0%	6.7%	14.3%

Borst who employed several pictures, groups the results under the following categories: (1) Objects and persons. (2) Qualities, excluding color. (3) Colors. (4) Spatial relations. (5) Activities. (6) Numerical relations. For these the percentages of memory illusions are:

Obj. and persons.	Qualities, excluding colors.	Colors.	Spatial relations.	Activities.	Numerical relations.
6.6	17.7	30.4	7.1	15.5	22.3

Wreschner groups his figures on memory illusion under the categories of (1) personal characteristics, and (2) characteristics of things, for the picture of the old man with a bowl of food, feeding a small boy by his side. His percentages are:

	Grandfather.	Boy.
Personal characteristics	30.4%	43.6%
Characteristics of things	42.7%	77.2%

Results from two studies by Stern may be quoted in addition. One concerns the description from memory of a lecture room; the other, that of the complex picture of a peasant's room. In the first case the percentages of memory error in answering a number of questions may be given. These are:

	Per cent.
Appearance of outside of entrance door,	2
Appearance of ceiling,	2
Appearance of lecture stand,	6
Presence of bars before windows,	13
Appearance of inside of entrance door,	17
Presence of stove in room,	21
No. of windows,	28
Position of door,	66
Presence of a second door,	74

The second of Stern's studies is that in which he used the complex picture of a peasant's room. The percentages of memory illusion, considering all the statements made, are as follows, for the different things in the picture:

Man.	Woman.	Boy.	Cradle.	Child in cradle.	Clock.	Pictures on wall.	Doll.	Bed.	Window.	Dog.
0	0	3.0	4.0	5.0	5.0	6.5	8.0	11.0	11.0	24.0

Grouping the results under different categories, he has:

Things.	Persons.	Activities and Cond. of persons.	Spatial.	Qualities.	Colors.	Numerical.
4	2	10	.67	.33	17.	31.

So far as quantitative differences go, these figures speak for themselves. They show great differences, varying in one of Stern's studies from 2 to 74%. Of the two factors here combined in producing such differences the degree of attention and interest is undoubtedly the more important one. The *central* things are the ones about which statements from memory are most apt to be correct. The minor details that give these a setting are objects of less interest, are not particularly attended to, and, when described from memory, are apt to be wrongly described. Thus in Borst's results the statements about objects and persons in the pictures give the lowest percentage of illusion. In Wreschner's results the statements about characteristics of persons are less frequently wrong than are statements about characteristics of things. In Stern's picture the peasant and his wife are the points of central interest, and statements about them are always correct, while one-fourth of the statements about the dog are wrong.

There is a third general condition that has been found to influence the extent of memory illusion. This is the condition under which a statement is made, *i. e.*, as to whether it is an answer to a question, or is a spontaneous statement on the part of the subject. Several studies give results on this point, and they are all in entire agreement. Lipmann's studies (1) on the description of an event taking place in a lecture room during a lecture, and (2) on the description of a lecture room, gave the following results:

- | | | |
|-----|------------------------------|---------------------------|
| (1) | Without questions—10% wrong; | with questions—42% wrong. |
| (2) | “ “ —27% “ “ “ “ —27% “ “ | |

Borst's figures are: without questions, 11% wrong; with questions, 17% wrong. Stern's figures for the description of an event in a lecture room are: Without questions—23% wrong; with questions—49% wrong. For the description of the picture of the peasant's room they are: Without questions—6% wrong; with questions—33% wrong.

These figures, taken together, leave no doubt of the fact that memory illusion is greater when the statements made are answers to particular questions, than when the statements are made spontaneously on the part of the subject without special questioning. Two possible, or partial explanations of this fact should be considered. (1) When a subject describes a thing from memory on his own account, the things most prominent, and best remembered will come to his mind, while others will not be recalled at all, and thus the possibility of making misstatements concerning them will be avoided. (2) Questions are always more or less suggestive in the first place, and they may as frequently suggest the wrong thing as they do the right. They are also as apt to touch upon matters to which one has attended but little and therefore remembers poorly, as they are to touch upon the others. These two factors taken together account readily for the greater tendency to memory illusion when the statements are answers to questions. Both in reality depend upon the degree of attention and interest with which the different elements in a complex experience are originally apperceived.

With this statement of the extent of memory illusion in general, and of its extent as dependent upon special conditions we may turn now to the interpretation of the results, to the question of what the nature of memory illusion really is. It has been seen that in general when the average man reports a thing from memory and conscientiously believes that he is stating the truth, he is, nevertheless, mistaken about one-fourth of the time. And this tendency to false memory is the greater the longer the time since the original experience and the less carefully one has observed. In other words, memory illusion follows the same

laws, in these matters, as does simple forgetting. The suggestion was made at the beginning of this review that misstatements from memory might be due either to genuine memory illusion, or to what may be called carelessness in discrimination in the process of recall. The results on the conditions that influence the extent of memory illusion suggest that what is here called illusion is not always genuinely of that nature. If it were, we should have to say that the tendency for the recognitive elements to get assimilated with the wrong content increased with the time interval, and with the lack of attention and interest with which the experience had been regarded. This might, of course, be the fact always, however strange it might seem in the entire absence of any explanation that we could imagine for it. That it does happen sometimes is borne out by general observation. In all cases, for instance, in which one *frequently* thinks over his experiences he is very apt to come in the end to seem to remember very clearly things of which he was at first very doubtful; and his memory is quite apt to be wrong. This happens through a confusion of what he at first remembered, and what he afterwards often imagined. In other words, he forgets that he has only imagined a thing of which his memory was not certain, and then remembers what he has imagined as though it were a real memory of an actual fact. The habitual liar who finally comes to believe that his stories are true, if there is such, would be an illustration of the point in question. But in all instances in which the experience is not frequently gone over in memory, such a process is eliminated, and the question arises whether in such cases our false memories proceed from real memory illusion, or whether they are due to other causes. That they should result from illusion is not *a priori* probable. For there are no evident reasons why in these instances memory illusion should increase with the time interval, and be the greater the less carefully one has observed. We know that memory imagery is, under these conditions, less complete, less vivid, and more apt to be absent entirely, but this does not account for the wrong imagery being more apt to be taken for the right. The recognitive elements that are assimilated with the central core of our memory imagery should be affected in the same direction by time as is the latter. We know that these are, however, even less affected by time than is the image; for recognition is often possible after the image can no longer be revived. Some light is thrown upon the nature of the whole process by a general, but none the less trustworthy observation, namely; that in attempting to reconstruct an experience from memory it is not really from memory alone that we proceed. We reconstruct such an experience very largely from our knowledge of how things ought to have or must have been.¹ We rely only in part upon our recognition or memory of how they really were. The significant thing about this observation in connection with the present question is the light it throws upon what the general condition of our recognitive memory must be. It indicates at once that the recognitive elements play a much smaller part in what we are accustomed to call memory judgments than is generally supposed to be the case. They are not the only means by which we decide what the facts of our experience have been, perhaps not the main means. And this very strongly favors the view that much of what we call memory illusion is not that at all, but is mistaken judgment, resulting from other sources than memory.

It would be interesting to turn now to a more detailed consideration of what these other influences may be which determine our judgments of past experiences, and which may produce wrong as well as correct

¹ Stratton: *Experimental Psychology and Culture*, N. Y., 1903, p. 187.

judgments, but little can be said further on the matter. We are left with a few suggestions only, and no well established facts. The question is still one for investigation. In a number of experiments on the memory for weak intensities of sounds it has been found that the second is very frequently judged as more intense than the one just previously given, although objectively they were the same. On the other hand Baldwin and Shaw found that certain sized squares increased in memory so that when the subject was requested to choose a square just equal in size to one previously shown, he chose one that was larger.¹ But Leuba found that for different intensities of light one rule holds true for weak intensities, another rule for greater intensities.² We have here two classes of memory illusion that have been differently explained. The old explanation of the fact that of two equal intensities the second is judged the greater, was that the memory image of the first weakened. But Leuba's results contradict such an explanation, and Bentley's³ and Whipple's⁴ studies make it further impossible. Leuba explains his results by the assumption that our memory tends towards 'average experiences.' Weak intensities of light we thus remember as more intense than they really were, and great intensities we remember as weaker than they really were. This explanation brings in a wide principle of interpretation of memory illusion in the memory of any kind of experience. We may substitute for this statement another form and say that we remember things as we have been accustomed to experience them. The unusual, unless this fact has been particularly noted in the original observation, tends, in memory, to take the form of the usual. It is easier for the mind to move in the lines of its habits, and it does so even to the extent of confusing its new with its old experiences. We might say that here, again, where there is a misstatement due to this tendency, we are concerned with a genuine memory illusion; that where we substitute the usual, and habitual for something which differs somewhat from this there are attached to our imagery the cognitive elements that make it a true memory act. But there is no need of such an assumption. It is more probable that the fact is better accounted for by the absence, and inadequacy, generally, of these cognitive elements. That the memory judgment is frequently not made upon the basis of these is indicated by the observation that we so often reconstruct our past experience by reasoning it out. It is because of the absence of the real memory consciousness that these other factors can come in to decide what we call our memory judgments. In our ordinary thinking we have not the power of keen discrimination as to what these judgments are based on. We confuse our rational constructions with our real memories; we reason a thing out and then say that we remember that it was so. Habitual imagery has some of the general characteristics of complete memory imagery in its greater ease of arousal, and arousal in greater detail and vividness. With the lack of close discrimination for these border cases, we take the one for the other: the habitual image that is wrong, for a real memory image that is right.

We have thus suggested two factors that produce misstatements concerning our past experience, of the sort that have been called memory illusions; (1) rational construction, and (2) the tendency for the mind to substitute in the recall of the past the usual and habitual for what has differed slightly from that. Both rest ultimately on the gen-

¹ Memory for Square-Size. *Psych. Rev.*, Vol. II.

² A new Instrument for Weber's Law, with Indications of a Law of Sense Memory. *Am. Jour. of Psych.*, Vol. V.

³ Bentley: The Memory Image and its Qualitative Fidelity, *Am. Jour. of Psych.*, Vol. XI.

⁴ Whipple: *Op. cit.*

eral absence and inadequacy of our recognitive consciousness. Considering these main results of the studies on normal memory illusion, it might be well to turn our attention in conclusion to the conception of memory that they give in contrast with the older and still common view of memory images as 're-incarnations' of past experiences, as 'faded copies' of original perceptions. This comparison needs only to be suggested to show the long way we have gone from that older view. The errors and short comings of the latter are patent in the light of even the few established results already reached. The fewness of these results, and at the same time the influence they are having on our psychology of memory, point to a large and promising field of inquiry, a field full also of practical implications of great importance.

Clark University.

F. KUHLMANN.

Atlas of the Nervous System: including an epitome of the anatomy, pathology and treatment. By C. JAKOB, with a preface by A. von Struempell. Translation from the second German edition; edited by E. D. Fisher. W. B. Saunders & Co., Philadelphia and London; 1901. pp. 218. (112 colored lithographic figures and 139 other illustrations.)

I am glad of the opportunity to recommend this little book to my colleagues of psychology who are obliged, from time to time, to have recourse to text-books of neurology. The work has its obvious limitations, both of space and of time; it covers an immense field in small compass, and the German original, from which the translation has been made, dates back to 1899. Despite these drawbacks, it is one of the most useful and reliable compendia with which I am acquainted.

E. B. T.

Willensfreiheit und wahre Freiheit: mit einem Anhang über den heutigen Stand der Frage vom freien Willen, von G. TORRES, München, 1904. pp. 46.

This is a sensible essay upon the eternal problem of human freedom, in which the author draws a sharp distinction between philosophical or causal and practical or relative freedom, and discusses in detail the questions of merit and responsibility from the standpoint of determinism. The book is written on a moral basis and in ethical terms; but its underlying psychology is sound, and its positions can readily be translated into psychological language.

P. E. WINTER.

The Eternal Life, by HUGO MUENSTERBERG. Houghton, Mifflin & Co., Boston and New York, 1905. pp. 72.

The author sets out from his well-known thesis that the world of science, temporal, spatial, causal, is merely a construction, made for special purposes by the free personality of man. To approach the question of the eternal life, we must "emancipate ourselves from this unnatural view, and apperceive our life as act and not as object, as creator of time and not as a chance occurrence in time" (p. 26). "The real personality, the subject of will and thought, is not an object in time, as it is itself the condition of time. Its whole reality lies in its attitudes and in its acts" (pp. 16 f.). "My real life as a system of interrelated will-attitudes . . . is independent of birth and death; . . . it is immortal; all possible thinkable time is inclosed in it; it is eternal" (p. 27). "We do not desire the tone of this individual life to last beyond its internal, eternal rôle, throughout the symphony of the Absolute; its immortality is its perfect belonging to that whole timeless reality, belonging there through its human relations to its neighbors, and through its ideal relations to the ultimate values" (p. 70). These quotations will give some idea of the writer's standpoint, which,